Can Humanity Learn to become Civilized?
The Crisis of Science without Civilization

(Published in *Journal of Applied Philosophy 17*, 2000, 29-44.)

Nicholas Maxwell
Emeritus Reader in Philosophy of Science at University College London
Email: nicholas.maxwell@ucl.ac.uk
Website: http://www.nick-maxwell.demon.co.uk

Abstract
Two great problems of learning confront humanity: learning about the nature of the universe and our place in it, and learning how to become civilized. The first problem was solved, in essence, in the 17th century, with the creation of modern science. But the second problem has not yet been solved. Solving the first problem without also solving the second puts us in a situation of great danger. All our current global problems have arisen as a result. What we need to do, in response to this unprecedented crisis, is learn from our solution to the first problem how to solve the second. This was the basic idea of the 18th century Enlightenment. Unfortunately, in carrying out this programme, the Enlightenment made three blunders, and it is this defective version of the Enlightenment programme that we have institutionalized in 20th century academic inquiry. In order to solve the second great problem of learning we need to correct the three blunders of the traditional Enlightenment. This involves changing the nature of social inquiry, so that social *science* becomes social *methodology* or social *philosophy*, concerned to help us build into social life the progress-achieving methods of aim-oriented rationality, arrived at by generalizing the progress-achieving methods of science. It also involves, more generally, bringing about a revolution in the nature of academic inquiry as a whole, so that it takes up its proper task of helping humanity learn how to become wiser by increasingly cooperatively rational means. The scientific task of improving knowledge and understanding of nature becomes a part of the broader task of improving global wisdom.

Humanity faces two great problems of learning: learning about the nature of the universe and our place in it, and learning how to become civilized.

The first problem was cracked, in essence, in the 17th century, with the birth of modern science. A *method* was discovered for progressively improving knowledge and understanding of the natural world, the famous empirical method of science. There is of course much that we still do not know and understand, three or four centuries after the birth of modern science; nevertheless, during this time, science has immensely increased our knowledge and understanding, at an ever accelerating rate. And with this unprecedented increase in scientific knowledge and understanding has come a cascade of technological discoveries and developments which have transformed the human condition [1]. It is this that has made the modern world possible, so different in a multitude of ways from the world experienced by people in Europe or north America only one or two centuries ago.

But it is much less certain that the second great problem of learning has been cracked. Many, indeed, doubt that it can be solved at all. The 20th century record is not exactly encouraging when one takes into account the millions slaughtered in countless wars, the

millions killed in death camps, the all too many totalitarian regimes, the billions living today in conditions of abject poverty in the third world, the annihilation of languages, cultures and traditional ways of life during the century, the destruction of natural habitats and the rapid extinction of species.

One might conclude that we are growing, not more civilized, but more barbaric. This is, however, to draw the wrong conclusion from history. All our distinctively 20th century disasters have one underlying cause: we have solved the first great problem of learning without *also* having solved the second problem [2].

With rapidly increasing scientific knowledge comes rapidly increasing technological know-how, which brings with it an immense increase in the power to act. In the absence of a solution to the second great problem of learning, the increase in the power to act may have good consequences, but will as often as not have all sorts of harmful consequences, whether intended or not.

Just this is an all too apparent feature of our world. Science and technology have been used in endless ways for human benefit, but have also been used to wreak havoc, whether intentionally, in war, or unintentionally, in long-term environmental damage - a consequence of growth of population, industry and agriculture, made possible by growth of technology. As long as humanity's power to act was limited, lack of wisdom, of enlightenment did not matter too much: humanity lacked the means to inflict too much damage on the planet [3]. But with the immense increase in our powers to act that we have achieved in the last century or so, our powers to destroy have become unprecedented and terrifying: global wisdom has become, not a luxury, but a necessity. All our distinctively 20th century global problems, to repeat, have arisen because we have solved the first great problem of learning without also solving the second problem. Solving the first great problem of learning without solving the second is bound to put humanity into a situation of great danger, *and has in fact done just that*.

It has become a matter of extreme urgency, for the future of humanity, that we discover how to solve the second great problem of learning, not so that we achieve instant global wisdom, but so that we learn how to make gradual social progress towards a wiser world.

The question arises: Can we learn from our solution to the first great problem of learning how to solve the second problem? Can the progress-achieving methods of science be generalized so that they become fruitfully applicable to the immense task of making social progress towards a more civilized world?

The Enlightenment

The idea of learning from the solution to the first great problem of learning how to solve the second problem is an old one. It goes back to the Enlightenment of the 18th century. Indeed, this was the basic idea of the *philosophes* of the Enlightenment - Voltaire, Diderot, Condorcet et al.: to learn from scientific progress how to achieve social progress towards world enlightenment.

The best of the *philosophes* did what they could to put this immensely important idea into practice, in their lives. They fought dictatorial power, superstition, and injustice with weapons

no more lethal than those of argument and wit. They gave their support to the virtues of tolerance, openness to doubt, readiness to learn from criticism and from experience. Courageously and energetically they laboured to promote rationality in personal and social life [4].

Unfortunately, in developing the Enlightenment idea intellectually, the *philosophes* blundered. They developed the Enlightenment programme in a seriously defective form, and it is this immensely influential, defective version of the programme, inherited from the 18th century, which may be called the "traditional" Enlightenment, that is built into late 20th century institutions of inquiry. Our current traditions and institutions of learning, when judged from the standpoint of helping us learn how to become more enlightened, are defective and irrational in a wholesale and structural way, and it is this which, in the long term, sabotages our efforts to create a more civilized world, and prevents us from avoiding the kind of horrors we have been exposed to during the 20th century - wars, third-world poverty, environmental degradation.

The *philosophes* of the 18th century assumed, understandably enough, that the proper way to implement the Enlightenment programme was to develop social science alongside natural science. Francis Bacon had already stressed the importance of improving knowledge of the natural world in order to achieve social progress [5]. The *philosophes* generalized this, holding that it is just as important to improve knowledge of the social world. Thus the *philosophes* set about creating the social sciences: history, anthropology, political economy, psychology, sociology.

This had an immense impact. Throughout the 19th century the diverse social sciences were developed, often by non-academics, in accordance with the Enlightenment idea [6]. Gradually, universities took notice of these developments until, by the mid 20th century, all the diverse branches of the social sciences, as conceived of by the Enlightenment, were built into the institutional structure of universities as recognized academic disciplines.

But, from the standpoint of creating a kind of inquiry designed to help humanity learn how to become civilized, all this amounts to a series of monumental blunders.

In order to implement properly the basic Enlightenment idea of learning from scientific progress how to achieve social progress towards a civilized world, it is essential to get the following three things right.

1. The progress-achieving methods of science need to be correctly identified.
2. These methods need to be correctly generalized so that they become fruitfully applicable to any human endeavour, whatever the aims may be, and not just applicable to the endeavour of improving knowledge.
3. The correctly generalized progress-achieving methods then need to be exploited correctly in the great human endeavour of trying to make social progress towards an enlightened, civilized world.

Unfortunately, the *philosophes* of the Enlightenment got all three points disastrously wrong. They failed to capture correctly the progress-achieving methods of natural science; they failed to generalize these methods properly; and, most disastrously of all, they failed to apply them

properly so that humanity might learn how to become civilized by rational means. That the *philosophes* made these blunders in the 18th century is forgivable; what is unforgivable is that these blunders still remain unrecognized and uncorrected today, over two centuries later. Instead of correcting the blunders, we have allowed our institutions of learning to be shaped by them as they have developed throughout the 19th and 20th centuries, so that now the blunders are an all-pervasive feature of our world.

The Enlightenment, and what it led to, has long been criticized, by the Romantic movement, by what Isaiah Berlin has called 'the counter-Enlightenment' [7], and more recently by the Frankfurt school, by postmodernists and others [8]. The objection to the traditional Enlightenment of this essay is substantially different. In particular, it is the very opposite of all those anti-rationalist, romantic and postmodernist criticisms which object to the way the Enlightenment gives far too great an importance to natural science and to scientific rationality. According to the argument of this essay, what is wrong with the traditional Enlightenment, and the kind of academic inquiry we now possess derived from it, is not too much 'scientific rationality' but, on the contrary, not enough. It is the glaring, wholesale *irrationality* of contemporary academic inquiry, when judged from the standpoint of helping humanity learn how to become more civilized, that is the problem.

The "New" Enlightenment

What exactly are the three blunders of the traditional Enlightenment, as embodied in academic inquiry today, and what needs to be done to put them right? Let us take the three blunders in turn.

The *first* blunder concerns the nature of the progress-achieving methods of science. Scientists and philosophers of science today make the assumption, inherited from the Enlightenment [9], that science makes progress because, in science, theories are assessed impartially on the basis of evidence alone, *no permanent assumption being made about the nature of the universe independent of evidence*. Choice of theory in science may be influenced by such considerations as the relative simplicity, unity or explanatory power of the theories in question, in addition to empirical considerations; this is permissible, as long as it does not involve assuming, permanently, that nature herself is simple, unified or comprehensible [10].

But this orthodox *standard empiricist* assumption about the nature of the progress-achieving methods of science is untenable [11]. Given any scientific theory, however well verified empirically, there will always be infinitely many rival theories, equally well supported by the evidence, which make different predictions, in an arbitrary way, for phenomena not yet observed. One can set out to refute these rival theories by making the relevant observations or experiments, but as there are infinitely many of them this may take some time. In short, if science really did take seriously the idea that theories must be selected on the basis of evidence alone, science would be swamped by an infinity of empirically equally successful rival theories; science would come to an end.

This does not happen in scientific practice because, in practice, given an accepted, well verified theory, such as Newtonian theory, quantum theory, or general relativity, almost all the infinitely many equally empirically successful rival theories are, in comparison, grotesquely *ad hoc* and disunified. They postulate, arbitrarily, that - for example - at some time in the future

Newton's inverse square law of gravitation becomes an inverse cube law. Such theories are, in practice, excluded from scientific consideration on the grounds that they lack simplicity, unity or explanatory power.

Now comes the crucial point. In persistently excluding infinitely many such empirically successful but grotesquely *ad hoc* theories, science in effect makes a big assumption about the nature of the universe, to the effect that it is such that no grotesquely *ad hoc* theory is true, however empirically successful it may appear to be for a time. Without some such big assumption as this, the empirical method of science collapses. Science is drowned in an infinite ocean of empirically successful *ad hoc* theories [12].

At once the question arises: Granted that science must make some kind of big assumption about the nature of the universe if it is to be possible at all, what precisely ought this assumption to be, and on what basis is it to be made? We must make some assumption about the ultimate nature of the universe before science can proceed at all; if science is to proceed successfully we must make an assumption that is near enough correct: and yet it is just here that we are horribly ignorant, and are almost bound to get things hopelessly wrong.

The solution to this basic dilemma confronting the scientific endeavour (as expounded in some detail in my *The Comprehensibility of the Universe*) can be put like this. Cosmological speculation about the ultimate nature of the universe, being necessary for science to be possible at all, must be regarded as a part of scientific knowledge itself, however epistemologically unsound it may be in other respects. The best such speculation available is that the universe is comprehensible in some way or other and, more specifically, in the light of the immense apparent success of modern natural science, that it is physically comprehensible. But both these speculations may be false; in order to take this possibility into account, we need to adopt a hierarchy of increasingly contentless cosmological conjectures concerning the comprehensibility and knowability of the universe until we arrive at the conjecture that the universe is such that it is possible for us to acquire some knowledge of something, a conjecture so contentless that it could not be rational for us to reject it in any circumstances whatsoever. As a result of adopting such a hierarchy of increasingly contentless cosmological conjectures in this way, we maximize our chances of adopting conjectures that promote the growth of knowledge, and minimize our chances of taking some cosmological assumption for granted that is false and impedes the growth of knowledge: see diagram 1. The hope is that as we increase our knowledge about the world we improve (lower level) cosmological assumptions implicit in our methods, and thus in turn improve our methods. As a result of improving our knowledge we improve our knowledge about how to improve knowledge. Science adapts its own nature to what it learns about the nature of the universe, thus increasing its capacity to make progress in knowledge about the world.

This *aim-oriented empiricist* methodology, in stark contrast to current orthodoxy, is the key to the success of modern science. The basic aim of science of discovering how, and to what extent, the universe is comprehensible is deeply problematic; it is essential that we try to improve the aim, and associated methods, as we proceed, in the light of apparent success and failure. In order to do this in the best possible way we need to represent our aim at a number of levels, from the specific and problematic to the highly unspecific and unproblematic, thus creating a framework of fixed aims and meta-methods within which the (more or less specific)

aims and methods of science may be progressively improved in the light of apparent empirical success and failure, as depicted in diagram 1. The result is that, as we improve our knowledge about the world we are able to improve our knowledge about how to improve knowledge, the methodological key to the rapid progress of modern science [13].

Adoption of this aim-oriented empiricist view by the scientific community as the official, orthodox conception of science would correct the first blunder of the traditional Enlightenment.

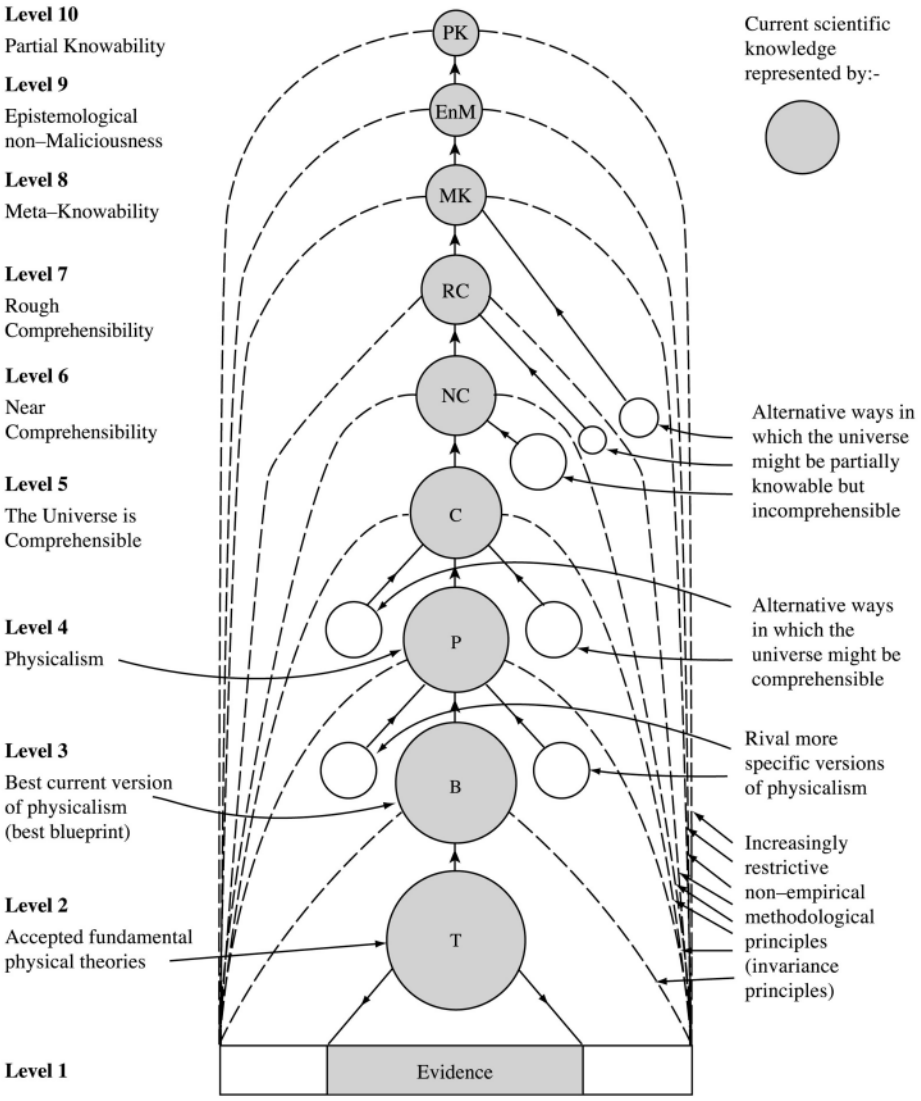

Diagram 1: Aim-Oriented Empiricism

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But what of the *second* blunder? The task, here, is to generalize the progress-achieving methods of science appropriately so that they become progress-achieving methods that are, potentially, fruitfully applicable to *any* problematic human endeavour. The task, in other words, is so to generalize scientific rationality that it becomes rationality *per se*, helping us to achieve what is of value whatever we may be doing.

Needless to say, scientists and philosophers, having failed to specify the methods of science properly, have also failed to arrive at the proper generalization of these methods. The best attempt known to me is that made by Karl Popper. According to Popper, science makes progress because it puts into practice the method of proposing theories as conjectures, which are then subjected to sustained attempted empirical refutation [14]. Popper argues that this can be generalized to form a conception of rationality, according to which one seeks to solve problems quite generally by putting forward conjectures as to how a given problem is to be solved, these conjectures then being subjected to sustained *criticism* (criticism being a generalization of attempted empirical refutation in science) [15].

Popper's ideas about scientific method and how it is to be generalized are an improvement over 18th century notions, but they are still defective. Popper's conception of scientific method is defective because it is a version of standard empiricism, which we have already seen is untenable. It fails to identify the problematic aim of science properly, and thus fails to specify the need for science to improve its aims and methods as it proceeds. Popper's notion of critical rationalism is defective in an analogous way. It does not make improving aims and methods, when aims are problematic, an essential aspect of rationality [16].

If, however, we take the above aim-oriented empiricist conception of scientific method as our starting point, and generalize that, the outcome is quite different. It is not just in science that aims are problematic; this is the case in life too, either because different aims conflict, or because what we believe to be desirable and realizable lacks one or other of these features, or both. Above all, the aim of creating global civilization is inherently and profoundly problematic [17]. Quite generally, then, and not just in science, whenever we pursue a problematic aim we need to represent the aim as a hierarchy of aims, from the specific and problematic at the bottom of the hierarchy, to the general and unproblematic at the top. In this way we provide ourselves with a framework within which we may improve more or less specific and problematic aims and methods as we proceed, learning from success and failure in practice what it is that is both of most value and realizable. Such an "aim-oriented" conception of rationality is the proper generalization of the aim-oriented, progress-achieving methods of science [18].

So much for the second blunder, and how it is to be put right. We come now to the *third* blunder.

This is by far the most serious of the three blunders made by the traditional Enlightenment. The basic Enlightenment idea, after all, is to learn from our solution to the first great problem of learning how to solve the second problem - to learn, that is, from scientific progress how to make social progress towards an enlightened world. Putting this idea into practice involves getting appropriately generalized progress-achieving methods of science *into social life itself*!

It involves getting progress-achieving methods into our institutions and ways of life, into government, industry, agriculture, commerce, international relations, the media, the arts, education. But in sharp contrast to all this, the traditional Enlightenment has sought to apply generalized scientific method, not to social *life*, but merely to social *science*! Instead of helping humanity learn how to become more civilized by rational means, the traditional Enlightenment has sought merely to help social scientists improve knowledge of social phenomena. The outcome is that today academic inquiry devotes itself to acquiring knowledge of natural and social phenomena, but does not attempt to help humanity learn how to become more civilized. This is the blunder that is at the root of our current failure to have solved the second great problem of learning [19].

In order to correct this third, monumental and disastrous blunder, we need, as a first step, to bring about a revolution in the nature of academic inquiry, beginning with social inquiry and the humanities (as set out in some detail in my *From Knowledge to Wisdom*) [20]. Social inquiry is not primarily social *science*. Its proper basic task is to help humanity build into institutions and social life quite generally the progress-achieving methods of aim-oriented rationality (arrived at by generalizing the progress-achieving methods of science as indicated above). Social inquiry (sociology, economics, anthropology and the rest) is thus social *methodology* or social *philosophy*. Its task is to help diverse valuable human endeavours and institutions gradually improve aims and methods so that the world may make social progress towards global enlightenment. And the primary task of academic inquiry, more generally, becomes to help humanity solve its problems of living in increasingly rational, cooperative, enlightened ways, thus helping humanity become more civilized. The basic aim of academic inquiry becomes to promote the growth of *wisdom* - wisdom being defined as the capacity to realize what is of value in life (and thus including knowledge and technological know-how). Those parts of academic inquiry devoted to improving knowledge, understanding and technological know-how contribute to the growth of wisdom.

As I have already remarked, the aim of achieving global civilization is inherently problematic. This means, according to aim-oriented rationality, that we need to represent the aim at a number of levels, from the specific and highly problematic to the unspecific and unproblematic. Thus, at a fairly specific level, we might, for example, specify civilization to be a state of affairs in which there is an end to war, dictatorships, population growth, extreme inequalities of wealth, and the establishment of democratic, liberal world government and a sustainable world industry and agriculture. At a rather more general level we might specify civilization to be a state of affairs in which everyone shares equally in enjoying, sustaining and creating what is of value in life *in so far as this is possible*. At a still more general level, civilization might be specified simply as that realizable world order we should seek to attain in the long term: see diagram 2.

As a result of building into our institutions and social life such a hierarchical structure of aims and associated methods, we create a framework within which it becomes possible for us progressively to improve our real-life aims and methods in increasingly cooperative ways as we live. Diverse philosophies of life - diverse religious, political, economic and moral views - may be cooperatively developed, assessed and tested against the experience of personal and social life. It becomes possible progressively to improve diverse *philosophies of life* (diverse views about what is of value in life and how it is to be realized) much as *theories* are

progressively and cooperatively improved in science. In doing this, humanity would at last have learned from the solution to the first great problem of learning how to go about solving the second problem.

Objections

I now consider, briefly, some objections that may be raised against the thesis and argument of this paper.

It may be objected that the traditional Enlightenment does not dominate current academic inquiry to the extent that I have assumed. But grounds for holding that it does are given in chapter six of my *From Knowledge to Wisdom*. There I looked at the following: (1) books about the modern university; (2) the philosophy and sociology of science; (3) statements of leading scientists; (4) Physics Abstracts; (5) Chemistry, Biology, Geo and Psychology Abstracts; (6) journal titles and contents; (7) books on economics, sociology and psychology; (8) philosophy. In 1984, the year *From Knowledge to Wisdom* was published, there can be no doubt whatsoever that the traditional Enlightenment (or "the philosophy of knowledge" as I called it in the book) dominated academic inquiry.

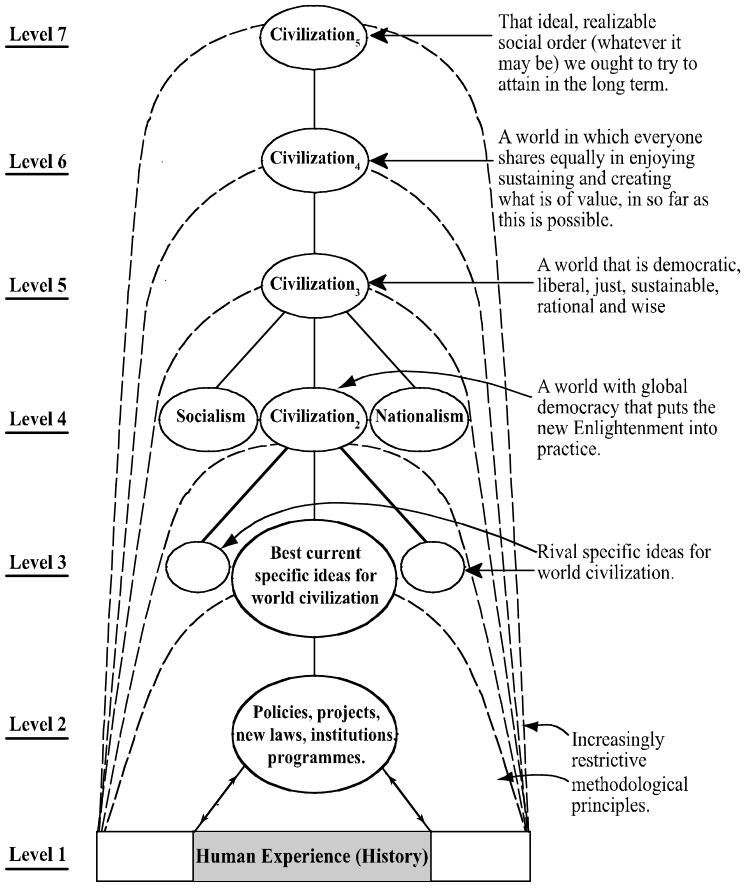

Diagram 2: Aim-Oriented Rationality applied to the task of making progress towards a civilized world

Have things changed since then? The revolution advocated by *From Knowledge to Wisdom*, and argued for here, has not occurred. There is still, amongst the vast majority of academics today, no awareness at all that a more intellectually rigorous and humanly valuable kind of inquiry than that which we have at present, exists as an option. In particular, social inquiry continues to be taught and pursued as social *science*, and not as social *methodology*. Recently I undertook an examination, at random, of thirty-four introductory books on sociology, published between 1985 and 1997. Sociology, typically, is defined as "the scientific study of human society and social interactions" [21], as "the *systematic, sceptical study of human society*" [22], or as having as its basic aim "to understand human societies and the forces that have made them what they are" [23]. Some books take issue with the idea that sociology is the *scientific* study of society, or protest at the male dominated nature of sociology [24]. Nowhere did I find a hint of the idea that a primary task of sociology, or of social inquiry more generally, might be to help build into the fabric of social life progress-achieving methods, generalized from those of science, designed to help humanity resolve its conflicts and problems of living in more cooperatively rational ways than at present.

The tackling of problems of living rather than problems of knowledge does of course go on within the academic enterprise as it is at present constituted, within such disciplines as economics, development studies, policy studies, peace studies, medicine, agriculture, engineering, and elsewhere. But this does not tell against the point that the primary task of academic inquiry at present is, first, to acquire knowledge and technological know-how, and then, second, to apply it to help solve problems of living. It does not, in other words, tell against the point that it is the traditional Enlightenment that is the dominant influence on the nature, the aims and methods, the whole character and structure of academic inquiry.

It may be objected that it is all to the good that the academic enterprise today does give priority to the pursuit of knowledge over the task of promoting wisdom and civilization. Before problems of living can be tackled rationally, knowledge must first be acquired [25].

I have six replies to this objection.

First, even if the objection were valid, it would still be vital for a kind of inquiry designed to help us build a better world to include rational exploration of problems of living, and to ensure that this guides priorities of scientific research (and is guided by the results of such research).

Second, the validity of the objection becomes dubious when we take into account the considerable success people met with in solving problems of living in a state of extreme ignorance, before the advent of science. We still today often arrive at solutions to problems of living in ignorance of relevant facts.

Third, the objection is not valid. In order to articulate problems of living and explore imaginatively and critically possible solutions (in accordance with Popper's conception of rationality) we need to be able to act in the world, imagine possible actions and share our

imaginings with others: in so far as some common sense knowledge is implicit in all this, such knowledge is required to tackle rationally and successfully problems of living. But this does not mean that we must give intellectual priority to acquiring new relevant knowledge before we can be in a position to tackle rationally our problems of living.

Fourth, simply in order to have some idea of what kind of knowledge or know-how it is *relevant* for us to try to acquire, we must *first* have some provisional ideas as to what our problem of living is and what we might do to solve it. Articulating our problem of living and proposing and critically assessing possible solutions needs to be intellectually prior to acquiring relevant knowledge simply for this reason: we cannot know what new knowledge it is *relevant* for us to acquire until we have at least a preliminary idea as to what our problem of living is, and what we propose to do about it. A slight change in the way we construe our problem may lead to a drastic change in the kind of knowledge it is relevant to acquire: changing the way we construe problems of health, to include *prevention* of disease (and not just curing of disease) leads to a dramatic change in the kind of knowledge we need to acquire (importance of exercise, diet etc.). Including the importance of avoiding *pollution* in the problem of creating wealth by means of industrial development leads to the need to develop entirely new kinds of knowledge.

Fifth, relevant knowledge is often hard to acquire; it would be a disaster if we suspended life until it had been acquired. Knowledge of how our brains work is presumably highly relevant to all that we do but clearly, suspending rational tackling of problems of living until this relevant knowledge has been acquired would not be a sensible step to take. It would, in any case, make it impossible for us to acquire the relevant knowledge (since this requires scientists to act in doing research). Scientific research is itself a kind of action carried on in a state of relative ignorance.

Sixth, the capacity to act, to live, more or less successfully in the world, is more fundamental than (propositional) knowledge. Put in Rylean terms, 'knowing how' is more fundamental than 'knowing that' [26]. All our knowledge is but a development of our capacity to act. Dissociated from life, from action, knowledge stored in libraries is just paper and ink, devoid of meaning. In this sense, problems of living are more fundamental than problems of knowledge (which are but an aspect of problems of living); giving intellectual priority to problems of living quite properly reflects this point [27].

It deserves to be noted that a kind of inquiry that gives priority to tackling problems of knowledge over problems of living violates the most elementary requirements of rationality conceivable. If the basic task is to help humanity create a better world, then the problems that need to be solved are, primarily, problems of living, problems of action, not problems of knowledge. This means that to comply, merely, with Popper's conception of critical rationalism (or problem-solving rationality) discussed above, the basic intellectual tasks need to be (1) to articulate problems of living, and (2) to propose and critically assess possible solutions, possible more or less cooperative human *actions*. (1) and (2) are excluded, or marginalized, by a kind of inquiry that gives priority to the task of solving problems of knowledge. And the result will be a kind of inquiry that fails to create a reservoir of imaginative and critically examined ideas for the resolution of problems of living, and instead develops knowledge often unrelated to, or even harmful to, our most basic human needs.

It may be objected that in employing aim-oriented rationality in an attempt to help create a more civilized world, in the way indicated above, the new Enlightenment falls foul of Popper's strictures against Utopian social engineering [28]. I have three replies to this objection. First, to the extent that piecemeal social engineering, of the kind advocated by Popper, is indeed the rational way to make progress towards a more civilized world, this will be advocated by the New Enlightenment. Second, when we take into account the unprecedented *global* nature of many of our most serious problems, indicated at the beginning of this essay (the outcome of solving the first great problem of learning but failing to solve the second), we may well doubt that piecemeal social engineering is sufficient. Third, Popper's distinction between piecemeal and Utopian social engineering is altogether too crude: it overlooks entirely what has been advocated here, aim-oriented rationalistic social engineering, with its emphasis on developing increasingly cooperatively rational resolutions of human conflicts and problems in full recognition of the inherently problematic nature of the aim of achieving greater civilization [29].

All those to any degree influenced by Romanticism and the counter-Enlightenment will object strongly to the idea that we should learn from scientific progress how to achieve social progress towards civilization; they will object strongly to the idea of allowing conceptions of rationality, stemming from science, to dominate in this way, and will object even more strongly to the idea, inherent in the new Enlightenment, that we need to create a more aim-oriented rationalistic social world [30].

Directed at the traditional Enlightenment, objections of this kind have some validity; but directed at the new Enlightenment, they have none. As I have emphasized elsewhere, aim-oriented rationality amounts to a synthesis of traditional rationalist and romantic ideals, and not to the triumph of the first over the second. In giving priority to the realization of what is of value in life, and in emphasizing that rationality demands that we seek to improve aims as we proceed, the new Enlightenment requires that rationality integrates traditional Rationalist and Romantic values and ideals of integrity. Imagination, emotion, desire, art, empathic understanding of people and culture, the imaginative exploration of aims and ideals, which tend to be repudiated as irrational by traditional Rationalism, but which are prized by Romanticism, are all essential ingredients of aim-oriented rationality. Far from crushing freedom, spontaneity, creativity and diversity, aim-oriented rationality is essential for the desirable flourishing of these things in life [31].

Many historians and sociologists of science deny that there is any such thing as scientific method or scientific progress, and will thus find the basic idea of this essay absurd [32]. These writers are encouraged in their views by the long-standing failure of scientists and philosophers of science to explain clearly what scientific method is, and how it is to be justified. This excuse for not taking scientific method and progress seriously is, however, no longer viable: as I have indicated above, reject standard empiricism in all its forms, and it becomes clear how scientific method and progress are to be characterized and justified, in a way which emphasizes the rational interplay between evolving knowledge and evolving aims and methods of science [33]. In a world dominated by the products of scientific progress it is quixotic in the extreme to deny that such progress has taken place.

Finally, those of a more rationalist persuasion may object that science is too different from political life for there to be anything worthwhile to be learnt from scientific success about how to achieve social progress towards civilization [34]. (a) In science there is a decisive procedure for eliminating ideas, namely, empirical refutation: nothing comparable obtains, or can obtain, in the political domain. (b) In science experiments or trials may be carried out relatively painlessly (except, perhaps, when new drugs are being given in live trials); in life, social experiments, in that they involve people, may cause much pain if they go wrong, and may be difficult to stop once started. (c) Scientific progress requires a number of highly intelligent and motivated people to pursue science on the behalf of the rest of us, funded by government and industry; social progress requires almost *everyone* to take part, including the stupid, the criminal, the mad or otherwise handicapped, the ill, the highly unmotivated; and in general there is no payment. (d) Scientists, at a certain level, have an agreed, common objective: to improve knowledge. In life, people often have quite different or conflicting goals, and there is no general agreement as to what civilization ought to mean, or even whether it is desirable to pursue civilization in *any* sense. (e) Science is about fact, politics about value, the quality of life. This difference ensures that science has nothing to teach political action (for civilization). (f) Science is male-dominated, fiercely competitive, and at times terrifyingly impersonal [35]; this means it is quite unfit to provide any kind of guide for life.

Here, briefly, are my replies. (a) Some proposals for action can be shown to be unacceptable quite decisively as a result of experience acquired through attempting to put the proposal into action. Where this is not possible, it may still be possible to assess the merits of the proposal to some extent by means of experience. If assessing proposals for action by means of experience is much more indecisive than assessing scientific theories by means of experiment, then we need, all the more, to devote our care and attention to the former case. (b) Precisely because experimentation in life is so much more difficult than in science, it is vital that in life we endeavour to learn as much as possible from (i) experiments that we perform in our imagination, and (ii) experiments that occur as a result of what actually happens. (c) Because humanity does not have the aptitude or desire for wisdom that scientists have for knowledge, it is unreasonable to suppose that progress towards global wisdom could be as explosively rapid as progress in science. Nevertheless progress in wisdom might go better than it does at present. (d) Cooperative rationality is only feasible when there is the common desire of those involved to resolve conflicts in a cooperatively rational way. (e) Aim-oriented rationality can help us improve our decisions about what is desirable or of value, even if it cannot reach decisions for us. (f) In taking science as a guide for life, it is the progress-achieving methodology of science to which we need to attend. It is this that we need to generalize in such a way that it becomes fruitfully applicable, potentially, to all that we do. That modern science is male-dominated, fiercely competitive, and at times terrifyingly impersonal should not deter us from seeing what can be learned from the progress-achieving methods of science - unless, perhaps, it should turn out that being male-dominated, fiercely competitive and impersonal is essential to scientific method and progress. (But this, I submit, is not the case.)

Conclusion

Having solved the first great problem of learning, it has become a matter of extreme urgency, as far as the future of humanity is concerned, that we discover how to solve the

second problem. In order to do this we need to correct the three blunders of the traditional Enlightenment. This involves changing the nature of social inquiry, so that social *science* becomes social *methodology* or social *philosophy*, concerned to help us build into social life the progress-achieving methods of aim-oriented rationality, arrived at by generalizing the progress-achieving methods of science. It also involves, more generally, bringing about a revolution in the nature of academic inquiry as a whole, so that it takes up its proper task of helping humanity learn how to become wiser by increasingly cooperatively rational means. The scientific task of improving knowledge and understanding of nature becomes a part of the broader task of improving global wisdom.

Notes

[1] There is a long-standing debate as to whether technology emerges from science, or develops independently, or actually contributes to science (as in the case of the steam engine leading to the development of thermodynamics). I sidestep this debate, here, and assume, merely that, as far as modern science is concerned, science and technology developed in tandem with each other, each contributing to the development of the other.

[2] It may be objected: it is not *science* that is the cause of our global problems but rather the things that we *do*, made possible by science and technology. This is obviously correct. But it is also correct to say that scientific and technological progress *is* the cause. The meaning of "cause" is ambiguous. By "the cause" of event E we may mean something like "the most obvious observable events preceding E that figure in the common sense explanation for the occurrence of E". In this sense, human actions (made possible by science) are the cause of such things as people being killed in war, destruction of tropical rain forests. On the other hand, by the "cause" of E we may mean "that prior change in the environment of E which led to the occurrence of E, and without which E would not have occurred". If we put the 20th century into the context of human history, then it is entirely correct to say that, in this sense, scientific-and-technological progress is the cause of distinctively 20th century disasters: what has changed, what is new, is scientific knowledge, not human nature. Yet again, from the standpoint of theoretical physics, "the cause" of E might be interpreted to mean something like "the physical state of affairs prior to E, throughout a sufficiently large spatial region surrounding the place where E occurs". In this third sense, the sun continuing to shine is as much a part of the cause of war and pollution as human action or human science and technology.

[3] Humans have been causing some environmental damage for centuries. Aldous Huxley cites the ancient destruction of the ceders of Lebanon as an example; see HUXLEY, A. (1980) *The Human Situation* (St. Albans, Triad/Panther Books,), pp. 21-22. For a discussion of the role of early man in causing extinction of species see HOLDGATE, M. (1996) *From Care to Action* (London, Earthscan), pp. 1-10.

[4] The best overall account of the Enlightenment that I know of is still: GAY, P. (1973) *The Enlightenment: An Interpretation* (London, Wildwood House, 1973).

[5] For the importance of Francis Bacon for the Enlightenment see: Gay, op. cit., vol. 1, pp. 11-12 and p. 322.

[6] Mill, Marx, Durkheim and Weber were all in thrall to the traditional Enlightenment.

[7] BERLIN, I. (1999) *The Roots of Romanticism* (London, Chatto and Windus); BERLIN, I. (1980) *Against the Current* (London, Hogarth Press), pp. 1-24.

[8] For a clearly written, recent, sympathetic but critical discussion of criticisms of the Enlightenment, from Horkheimer and Adorno, via Lyotard, Foucault, Habermas and Derrida to

MacIntyre and Rorty, see GASCARDI, A. (1999)) *Consequences of Enlightenment* (Cambridge, Cambridge University Press). For less sympathetic criticisms of postmodernists' anti-rationalism see: SOKAL, A. and BRICMONT, J. (1998) *Intellectual Impostures* (London, Profile Books, 1998); GROSS, P. et al. (1996), (Eds.) *The Flight from Science and Reason* (New York, Annals of the New York Academy of Sciences); KOERTGE, N. (1998), (Ed.) *A House Built on Sand: Exposing Postmodernist Myths About Science* (Oxford, Oxford University Press).

[9] The philosophes of the Enlightenment tended to assume that the triumph of Newtonian science over Cartesian science meant also the triumph of Newtonian inductivist methodology over Cartesian rationalism. They tended to espouse the extreme empiricism of Bacon and Locke, rejecting the rationalism of Descartes. But it is perhaps oversimplistic to interpret all the philosophes of upholding one or other version of standard empiricism. Kant hardly fits into such a picture. More to the point, d'Alembert asserted that "The universe, if we may be permitted to say so, would only be one fact and one great truth for whoever knew how to embrace it from a single point of view"; D'ALEMBERT, J. (1963) *Preliminary Discourse to the Encyclopedia of Diderot* (New York, Bobbs-Merrill}, p. 29, (originally published in 1751). This is perhaps compatible with, but hardly conforms to the spirit of standard empiricism.

[10] A classic statement of this widely held view is given by Karl Popper: "... in science, only observation and experiment may decide upon the *acceptance or rejection* of scientific statements, including laws and theories"; POPPER, K. (1963) *Conjectures and Refutations* (London, Routledge and Kegan Paul), p. 54. For an indication of just how widely held standard empiricism is, see MAXWELL, N. (1998) *The Comprehensibility of the Universe* (Oxford, Oxford University Press), pp. 38-45.

[11] It is worth noting that Newton upheld a conception of natural philosophy (natural science) that is, in important respects, more sophisticated than standard empiricism, presupposed by so many 20th century scientists and philosophers of science. Newton formulates three of his four rules of reasoning in such a way that it is clear that these rules make assumptions about the nature of the universe. Thus rule 1 asserts: "*We are to admit no more causes of natural things than such as are both true and sufficient to explain their appearances*." And Newton adds: "To this purpose the philosophers say that nature does nothing in vain, and more is in vain when less will serve; for Nature is pleased with simplicity, and affects not the pomp of superfluous causes." See NEWTON, I. (1962) *Principia* (Berkeley, University of California Press), vol. 2, p. 398. Newton understood that persistently preferring simple theories means that Nature herself is being persistently assumed to be simple (which violates standard empiricism).

[12] For a much more detailed refutation of standard empiricism, bare and dressed, see Maxwell op. cit., chs. 1-2.

[13] For a much more detailed exposition and defence of aim-oriented empiricism, and an account of the way aim-oriented empiricism solves long-standing problems in the philosophy of science such as problems of simplicity, induction and verisimilitude, see Maxwell op. cit., chs. 1 and 3-6.

[14] See Popper op. cit., and POPPER, K. (1959) *The Logic of Scientific Discovery* (London, Hutchinson).

[15] "inter-subjective *testing* is merely a very important aspect of the more general idea of inter-subjective *criticism*, or in other words, of the idea of mutual rational control by critical discussion", Popper op. cit., p. 44, n *1. See also POPPER, K. (1963) *Conjectures and Refutations* (London, Routledge and Kegan Paul), pp. 193-200; POPPER, K. (1976) *Unended*

Quest (Glasgow, Fontana), pp. 115-6; POPPER, K. (1972) *Objective Knowledge* (Oxford, Oxford University Press), p. 119 and p. 243.

[16] Popper's conception, though defective, does nevertheless provide acceptable necessary conditions for rationality. An endeavour or discipline which fails (1) to articulate its problems, and (2) to propose and critically assess possible solutions, violates absolutely elementary requirements for rationality. As we shall see, academic inquiry dominated by the traditional Enlightenment, giving priority to problems of knowledge over problems of living, violates rationality in just this way.

[17] There are a number of ways of highlighting the inherently problematic character of the aim of creating civilization. People have very different ideas as to what does constitute civilization. Most views about what constitutes Utopia, an ideally civilized society, have been unrealizable *and* profoundly undesirable. People's interests, values and ideals clash. Even values that, one may hold, ought to be a part of civilization may clash. Thus freedom and equality, even though inter-related, may nevertheless clash. It would be an odd notion of individual freedom which held that freedom was for some, and not for others; and yet if equality is pursued too singlemindedly this will undermine individual freedom, and will even undermine equality, in that a privileged class will be required to enforce equality on the rest, as in the old Soviet Union. A basic aim of legislation for civilization, we may well hold, ought to be increase freedom by restricting it: this brings out the inherently problematic, paradoxical character of the aim of achieving civilization. One thinker who has stressed the inherently problematic, contradictory character of the idea of civilization is Isaiah Berlin; see, for example, Berlin op. cit., pp. 74-79. Berlin thought the problem could not be solved; I, on the contrary, hold that aim-oriented rationality provides us with the means to learn how to improve our solution to it in real life.

[18] For a much more detailed exposition of aim-oriented rationality see MAXWELL, N. (1984) *From Knowledge to Wisdom* (Oxford, Blackwell), especially chs. 5 and 8.

[19] For a discussion of the extent to which the traditional Enlightenment dominates academic inquiry see Maxwell (1984) op. cit., ch. 6.

[20] See also MAXWELL, N.: (1976) *What's Wrong With Science? Towards a People's Rational Science of Delight and Compassion* (Frome, Bran's Head Books), pp. xi + 260; (1980) Science, Reason, Knowledge and Wisdom: A Critique of Specialism, *Inquiry*, 23, pp. 19-81; (1984) From Knowledge to Wisdom: Guiding Choices in Scientific Research, *Bulletin of Science, Technology and Society*, 4, pp. 316-34; (1985) From Knowledge to Wisdom: the Need for an Intellectual Revolution, *Science, Technology and Society Newsletter*, 21, pp. 55-63; (1986) The Fate of the Enlightenment: Reply to Kekes, *Inquiry*, 29, pp. 79-82; (1087) Wanted: a new way of thinking, *New Scientist*, 14 May, p. 63; (1991) How Can We Build a Better World?: in J. MITTELSTRASS (Ed.) *Einheit der Wissenschaften: Internationales Kolloquium der Akademie der Wissenschaften zu Berlin, 25-27 June 1990* (Berlin, Walter de Gruyter), pp. 388-427; (1992) What kind of Inquiry can best help us create a Good World?, *Science, Technology and Human Values*, 17, pp. 205-27; (1992) What the task of creating civilization has to learn from the success of modern science: towards a new enlightenment, *Reflections on Higher Education*, 4, pp. 47-69; (1993) Can Academic Inquiry help Humanity become Civilized?, *Philosophy Today*, 13, May, pp. 1-3; (1997) Science and the Environment: A New Enlightenment, *Science and Public Affairs*, Spring, pp. 50-56.

[21] TISCHLER, H. (1996) *Introduction to Sociology* (Orlando, Harcourt Brace), p. 4.

[22] MACIONIS, J. and PLUMMER, K,(1997) *Sociology: A Global Introduction* (New York, Prentice Hall), p. 4.

[23] LENSKI, G. et al. (1995) *Human Societies: An Introduction to Macrosociology* (New York, McGraw-Hill), p. 5.
[24] See, for example, ABOTT, P. and WALLACE, C. (1990) *An introduction to sociology: feminist perspectives* (London, Routledge), p. 3 and p. 1.
[25] This is the objection that most academics will wish to raise against the thesis of this essay. It will be made by all those who hold that academic inquiry quite properly seeks to make a contribution to human welfare by, first, acquiring knowledge and then, secondarily, applying it to help solve human problems.
[26] RYLE, G. (1949) *The Concept of Mind* (London, Hutchinson), ch. II.
[27] For a development of this point, see MAXWELL, N. (1984) *From Knowledge to Wisdom* (Oxford, Blackwell), pp. 174-181.
[28] POPPER, K. (1969) *The Open Society and Its Enemies* (London, Routledge and Kegan Paul), vol. 1, ch. 9; POPPER, K. (1974) *The Poverty of Historicism* (London, Routledge and Kegan Paul), pp. 64-92.
[29] For further discussion see Maxwell (1984) op. cit., pp. 189-198.
[30] For literature protesting against the influence of scientific rationality in various contexts and ways, see for example: BERLIN, I. (1999) *The Roots of Romanticism* (London, Chatto and Windus); LAING, R. D. (1965) *The Divided Self* (Harmondsworth, Penguin); MARCUSE, H. (1964) *One Dimensional Man* (Boston, Beacon Press): ROSZAK, T. (1973) *Where the Wasteland Ends* (London, Faber and Faber); BERMAN, M. (1981) *The Reenchantment of the World* (Ithaca, Cornell University Press); SCHWARTZ, B. (1987) *The Battle for Human Nature* (New York, W. W. Norton); FEYERABEND, P. (1978) *Against Method* (London, Verso) and (1987) *Farewell to Reason* (London, Verso,); APPLEYARD, B. (1992) *Understanding the Present: Science and the Soul of Modern Man* (London, Picador).
[31] See Maxwell (1984) op. cit., pp. 63-4, pp. 85-91 and pp. 117-118, for further discussion of this issue. See also MAXWELL, N. (1976) *What's Wrong With Science?* (Frome, Bran's Head Books), especially chs. 1 and 8-10.
[32] BLOOR, D. (1976) *Knowledge and Social Imagery* (London, Routledge and Kegan Paul); BARNES, B. and BLOOR, D. (1981) Relativism, Rationalism and the Sociology of Knowledge: in M. HOLLIS and S. LUKES (Eds.) *Rationality and Relativism* (Oxford, Blackwell), pp. 21-47; LATOUR, B. (1987) *Science in Action* (Milton Keynes, Open University Press); FEYERABEND, P. (1978) op. cit.; and FEYERABEND, P. (1987) op. cit. These authors might protest that they do not deny scientific knowledge, method, progress or rationality as such, but deny, merely, that the sociology of knowledge can legitimately appeal to such things, or deny extravagant claims made on behalf of these things. See, however, the sparkling criticism by Sokal and Bricmont op. cit., ch. 4.
[33] See MAXWELL, N. (1998) *The Comprehensibility of the Universe* (Oxford, Oxford University Press), especially chs 1-6.
[34] RESCHER, N. (personal communication); DURANT, J. (1997) Beyond the Scope of Science, *Science and Public Affairs*, Spring, pp. 56-57.
[35] HARDING, S. (1986) *The Feminist Question in Science* (Milton Keynes, Open University Press).